

skill or strength, by either the deactivation of the system or a failed portion thereof, or by overriding the failure by movement of the flight controls in the normal sense.

(c) It must be shown that, after any single failure of the stability augmentation system or any other automatic or power-operated system—

(1) The airplane is safely controllable when the failure or malfunction occurs at any speed or altitude within the approved operating limitations that is critical for the type of failure being considered;

(2) The controllability and maneuverability requirements of this part are met within a practical operational flight envelope (for example, speed, altitude, normal acceleration, and airplane configuration) that is described in the Airplane Flight Manual (AFM); and

(3) The trim, stability, and stall characteristics are not impaired below a level needed to permit continued safe flight and landing.

[Doc. No. 26269, 58 FR 42164, Aug. 6, 1993]

#### § 23.673 Primary flight controls.

Primary flight controls are those used by the pilot for the immediate control of pitch, roll, and yaw.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-48, 61 FR 5148, Feb. 9, 1996]

#### § 23.675 Stops.

(a) Each control system must have stops that positively limit the range of motion of each movable aerodynamic surface controlled by the system.

(b) Each stop must be located so that wear, slackness, or takeup adjustments will not adversely affect the control characteristics of the airplane because of a change in the range of surface travel.

(c) Each stop must be able to withstand any loads corresponding to the design conditions for the control system.

[Amdt. 23-17, 41 FR 55464, Dec. 20, 1976]

#### § 23.677 Trim systems.

(a) Proper precautions must be taken to prevent inadvertent, improper, or abrupt trim tab operation. There must

be means near the trim control to indicate to the pilot the direction of trim control movement relative to airplane motion. In addition, there must be means to indicate to the pilot the position of the trim device with respect to both the range of adjustment and, in the case of lateral and directional trim, the neutral position. This means must be visible to the pilot and must be located and designed to prevent confusion. The pitch trim indicator must be clearly marked with a position or range within which it has been demonstrated that take-off is safe for all center of gravity positions and each flap position approved for takeoff.

(b) Trimming devices must be designed so that, when any one connecting or transmitting element in the primary flight control system fails, adequate control for safe flight and landing is available with—

(1) For single-engine airplanes, the longitudinal trimming devices; or

(2) For multiengine airplanes, the longitudinal and directional trimming devices.

(c) Tab controls must be irreversible unless the tab is properly balanced and has no unsafe flutter characteristics. Irreversible tab systems must have adequate rigidity and reliability in the portion of the system from the tab to the attachment of the irreversible unit to the airplane structure.

(d) It must be demonstrated that the airplane is safely controllable and that the pilot can perform all maneuvers and operations necessary to effect a safe landing following any probable powered trim system runaway that reasonably might be expected in service, allowing for appropriate time delay after pilot recognition of the trim system runaway. The demonstration must be conducted at critical airplane weights and center of gravity positions.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-7, 34 FR 13091, Aug. 13, 1969; Amdt. 23-34, 52 FR 1830, Jan. 15, 1987; Amdt. 23-42, 56 FR 353, Jan. 3, 1991; Amdt. 23-49, 61 FR 5165, Feb. 9, 1996]

#### § 23.679 Control system locks.

If there is a device to lock the control system on the ground or water:

(a) There must be a means to—